A STUDY OF AZO DYES CONTAINING BORON

BY

SEYMOUR LIONEL MEISEL

B.S., Union College, 1944
M.S., University of Illinois, 1946

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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Introduction

Various investigators[1] have shown that certain tetrazo dyes having a benzidine nucleus are capable of intravital staining of malignant neoplasm. However, none of these dyes have shown any chemotherapeutic activity against the tumors in which they were selectively localized.

Kruger[2] has been able to irradiate boron with slow neutrons and has demonstrated that the decomposition products of this reaction have lethal effects on neoplastic tissue *in vitro*.

The purpose of the research was to synthesize tetrazo dyes containing boron, so that these irradiation experiments might be carried out *in vivo*.

Discussion of Results

A necessary intermediate in the synthesis of these dyes, 4,4′-diaminobiphenyl-2,2′-diboronic acid, was prepared by reduction of *m*-nitrobenzeneboronic acid to *m*-hydrazobenzeneboronic acid and subsequent rearrangement of this compound.[3] 4,4′-Diaminobiphenyl-2,2′-diboronic acid was coupled with H acid (1-amino-8-naphthol-3,6-disulfonic acid), Chicago acid (1-amino-8-naphthol-2,4-disulfonic acid), β-naphthol, acetoacetanilide, β-naphthylamine, R acid (1-naphthol-3,6-disulfonic acid) and NW acid (1-naphthol-4-sulfonic acid) to give dyes which contained boron. The analyses of all the dyes except those from the last three coupling components were in good agreement with the expected structures.

The coupling products of 4,4′-diaminobiphenyl-2,2′-diboronic acid with H acid and Chicago acid were observed to dialyze extremely slowly through a collodion membrane, indicating the colloidal nature of the dyes. This was extremely desirable since theories on selective absorption of dyes in

tumors postulate that the dye is in a colloidal form when absorbed.[4] Tests are now being conducted to determine whether the coupling product of 4,4′-diaminobiphenyl-2,2′-diboronic acid and H acid will preferentially stain tumors in rats.

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VITA

The author was born in Albany, New York, on August 14, 1922. He attended the public schools of Amsterdam, New York, and was graduated from Amsterdam High School in June, 1940. In the fall of the same year, he entered Union College in Schenectady, New York, receiving the B. S. degree in February, 1944. He enrolled in the Graduate School of the University of Illinois in October, 1944, and received the degree of Master of Science in February, 1946. At the University of Illinois, he was a teaching assistant from 1944 to 1945 and a University fellow from 1945 to 1947.

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